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IS 8851 (1994): Sulphur for rubber industry [PCD 13: Rubber and Rubber Products]



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भारतीय मानक

रबड़ उद्योग के लिए सल्फर — विशिष्ट

(पहला पुनरीक्षण)

Indian Standard

**SULPHUR FOR RUBBER INDUSTRY —
SPECIFICATION**

(First Revision)

UDC 661.21 : 678.044.4

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1978. The Committee responsible for its preparation decided to update the standard in the light of experience gained. In the present revision the requirements of sieve residue and relative density have been modified. The requirements of alkalinity and grit have been removed from Table 1. A requirement for melting point has been included in the standard.

Sulphur is one of the principal rubber vulcanizing agents. It is a critical additive. When chemically combined with rubber, sulphur develops basic performance properties in the vulcanized compound such as : tensile strength, elongation, modulus, and hardness. In soft or elastic rubber compounds, sulphur is an essential but minor additive. In semi-hard rubber and ebonite, sulphur becomes a major compounding material while retaining its role as a vulcanizing agent.

The most stable molecular form of sulphur at ambient conditions is a ring structure containing eight sulphur atoms. Depending on conditions these molecules orient into one of two crystalline structures. At room temperature the crystals are rhombic and above 95°C they rearrange to monoclinic. Less than 1.5 percent of either crystalline structure of sulphur is soluble in any rubber at room temperature.

The second common molecular form of sulphur is polymeric sulphur, made up of unbranched chains of sulphur atoms. It is commonly referred to in the rubber industry as insoluble sulphur. When this material is created by rapid heating to above 160°C and quenching to room temperature, the sulphur is amorphous. If formed under other conditions, the polymer chains may develop regions of pseudo crystallinity.

Rhombic sulphur (ordinary ground sulphur) which is the ordinary form of sulphur under normal conditions, is ground and classified to meet specific particle size requirements. The various grades of this type of sulphur contain less than 1 percent polymeric sulphur. The ground types of sulphur may also contain additives to enhance performance. Oil is added to sulphur to help control sulphur dust and improve dispersion in rubber. Finely ground solid minerals are also added to improve dispersion in rubber. Ordinarily the total additive level is 5 percent or less of the sulphur formulation. Many of these types of sulphur may be added to rubber compounds as 100 percent sulphur. A separate Indian Standard, IS 14127 : 1994 'Insoluble (Amorphous) sulphur for rubber industry' has been prepared.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SULPHUR FOR RUBBER INDUSTRY — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for sulphur for rubber industry.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

IS No.	Title
1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)
6655 : 1972	Methods of test for sulphur
6918 : 1972	Mercaptobenzothiazole
7086 (Part 1) : 1973	Methods of sampling and testing for rubber compounding ingredient, Part 1

3 REQUIREMENTS

The material shall comply with the requirements given in Table 1 when tested according to the methods prescribed in col 4 of the table.

4 PACKING AND MARKING

4.1 Packing

The material shall be packed in packages as agreed to between the purchaser and the supplier.

4.2 Marking

4.2.1 Each package shall be marked with the following:

- a) Material highly inflammable;
- b) Name and grade of the material;
- c) Indication of source of manufacture;
- d) Month and year of manufacture;
- e) Net mass of the material; and
- f) Batch or code number.

4.2.2 The package may also be marked with the Standard Mark.

4.2.3 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5 SAMPLING

5.1 Representative samples of the material shall be drawn as prescribed in 15 of IS 7086 (Part 1) : 1973.

5.2 Number of Tests — Test for all characteristics of the material given in Table 1 shall be conducted on composite sample.

5.3 Criteria for Conformity — The lot shall be declared as conforming to the requirements of the specification if all the test results on the composite sample satisfy the requirements.

6 TEST METHODS

6.1 Test shall be conducted according to the methods prescribed in col 4 of Table 1.

6.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070 : 1992) shall be used in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

Table 1 Requirements of Sulphur for Rubber Industry
(*Clauses 3, 5.2 and 6.1*)

Sl No.	Characteristics	Requirement	Method of Test, Ref to Clause No.
(1)	(2)	(3)	(4)
i)	Elemental sulphur, percent by mass, <i>Min</i>	99.5	3.1 of IS 6655 : 1972
ii)	Sieve residue, percent by mass, <i>Max</i> (dry)		3 of IS 7086 (Part 1) : 1973
	a) Through 63 mesh	20	
	b) Through 125 mesh	0.2	
	c) Through 180 mesh	0.02	
iii)	Relative density, 27°/27°C	2.05 to 2.15	4 of IS 7086 (Part 1) : 1973
iv)	Moisture content, percent by mass	0.15	3.2 of IS 6655 : 1972
v)	Ash, percent by mass, <i>Max</i> at 850°C	0.20	3.3 of IS 6655 : 1972
vi)	Acidity (as H_2SO_4), percent by mass, <i>Max</i>	0.025	3.4 of IS 6655 : 1972
vii)	Manganese, percent by mass, <i>Max</i>	0.002	11 of IS 7086 (Part 1) : 1973
viii)	Copper, percent by mass, <i>Max</i>	0.001	12 of IS 7086 (Part 1) : 1973
ix)	Iron, percent by mass, <i>Max</i>	0.003	13 of IS 7086 (Part 1) : 1973
x)	Melting point, °C	113-119	A-3 of IS 6918 : 1972

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